What is claimed is:

1. A starter generator for an internal combustion engine that operates as an electric motor for starting said internal combustion engine when said internal combustion engine is started, and operates as a generator after said internal combustion engine is started, comprising:

a magnet rotor mounted to a crankshaft of said internal combustion engine;

a stator having a polyphase first armature coil and a polyphase second armature coil;

a first battery and a second battery;

a first driver provided between said first armature coil and said first battery, and a second driver provided between said second armature coil and said second battery;

an inverter that converts a voltage of said first battery and a voltage of said second battery into an AC voltage; and

a controller that controls said first driver, said second driver, and said inverter,

wherein each driver includes: a polyphase rectifier circuit that is constituted by a bridge circuit of diodes, and rectifies an AC voltage induced in the corresponding armature coil to supply the AC voltage to the corresponding battery; and a polyphase switch circuit that is constituted by a bridge circuit of switch elements, each switch element being connected in anti-parallel to the corresponding diode that forms said polyphase rectifier circuit,

said controller includes: a driver control unit that flows drive currents to said first armature coil and said second armature coil from said first battery and said second battery through the polyphase switch circuits in said first driver and said second driver, respectively, so as to rotate said magnet

rotor in a direction of starting said internal combustion engine, when said internal combustion engine is started, and controls the polyphase switch circuits in said first driver and said second driver so as to keep, at a value equal to or less than a set value, DC voltages supplied to said first battery and said second battery from said first armature coil and said second armature coil through the polyphase rectifier circuits in said first driver and said second driver, after said internal combustion engine is started; and an inverter control unit that controls said inverter so as to output an AC voltage at a desired frequency from said inverter, and

said first battery and said second battery are connected in series or in parallel according to an effective value of the AC voltage output from said inverter and are connected between DC input terminals of said inverter.

2. A starter generator for an internal combustion engine that operates as an electric motor for starting said internal combustion engine when said internal combustion engine is started, and operates as a generator after said internal combustion engine is started, comprising:

a magnet rotor mounted to a crankshaft of said internal combustion engine;

a stator having an n-phase first armature coil and an n-phase second armature coil (n is an integer equal to or more than 3) wound around an armature core with magnetic pole portions facing magnetic poles of said magnet rotor;

a first driver including an n-phase rectifier circuit that is constituted by a bride circuit of diodes, an n-phase switch circuit that is constituted by a bridge circuit of switch elements, each switch element being connected in anti-parallel to the corresponding diode that forms said n-phase rectifier circuit, n-phase AC terminals drawn in common from said n-phase rectifier

circuit and said n-phase switch circuit, and a pair of DC terminals drawn in common from said n-phase rectifier circuit and said n-phase switch circuit, said n-phase AC terminals being connected to n-phase terminals of said first armature coil;

a second driver having the same construction as said first driver, n-phase AC terminals being connected to n-phase AC terminals of said second driver of said second armature coil;

a first battery connected between the DC terminals of said first driver, and a second battery connected between the DC terminals of said second driver;

an inverter having DC input terminals to which output voltages of said first battery and said second battery are input; and

a controller that controls said first driver, said second driver, and said inverter,

wherein said controller includes: a driver control unit that flows currents to said first armature coil and said second armature coil from said first battery and said second battery through the switch circuits in said first driver and said second driver, respectively, so as to rotate said magnet rotor in a direction of starting said internal combustion engine, when the internal combustion engine is started, and controls the switch circuits in said first driver and said second driver, so as to keep, at a value equal to or less than a set value, DC voltages supplied to said first battery and said second battery from said first armature coil and said second armature coil through the rectifier circuits in said first driver and said second driver, after said internal combustion engine is started; and an inverter control unit that controls said inverter so as to output an AC voltage at a commercial frequency from said inverter, and

said first battery and said second battery are connected in series or in

parallel according to an effective value of the AC voltage output from said inverter and are connected between DC input terminals of said inverter.

3. A starter generator for an internal combustion engine that operates as an electric motor for starting said internal combustion engine when said internal combustion engine is started, and operates as a generator after said internal combustion engine is started, comprising:

a magnet rotor mounted to a crankshaft of said internal combustion engine;

a stator having an n-phase first armature coil and an n-phase second armature coil (n is an integer equal to or more than 3) wound around an armature core with magnetic pole portions facing magnetic poles of said magnet rotor;

a first driver including an n-phase diode bridge full-wave rectifier circuit, an n-phase bridge type switch circuit that is constituted by a bridge circuit of switch elements, each switch element being connected in anti-parallel to the corresponding diode that forms said n-phase rectifier circuit, respectively, n-phase AC terminals drawn in common from said rectifier circuit and said switch circuit, and a pair of DC terminals drawn in common from said rectifier circuit and said switch circuit, said n-phase AC terminals being connected to n-phase terminals of said first armature coil;

a second driver having the same construction as said first driver, n-phase AC terminals of said second driver being connected to n-phase terminals of said second armature coil;

a first battery connected between the DC terminals of said first driver, and a second battery connected between DC terminals of said second driver;

a first diode having a cathode and an anode connected to a positive terminal of said first battery and a positive terminal of said second battery,

respectively;

a second diode having a cathode and an anode connected to a negative terminal of said first battery and a negative terminal of said second battery, respectively;

an inverter having a positive DC input terminal and a negative DC input terminal connected to the positive terminal of said first battery and the negative terminal of said second battery, respectively; and

a controller that controls said first driver, said second driver, and said inverter,

wherein said controller includes: driver control means for flowing currents to said first armature coil and said second armature coil from said first battery and said second battery through the switch circuits in said first driver and said second driver, respectively, so as to rotate said magnet rotor in a direction of starting said internal combustion engine, when the internal combustion engine is started, and controlling the switch circuits in said first driver and said second driver so as to keep, at a value equal to or less than a set value, DC voltages supplied to said first battery and said second battery from said first armature coil and said second armature coil through the rectifier circuits in said first driver and said second driver, after said internal combustion engine is started; and inverter control means for controlling said inverter so as to output an AC voltage at a commercial frequency from said inverter, and

the negative terminal of said first battery and the positive terminal of said second battery are connected or disconnected to transfer between a state where said first battery and said second battery are connected in series and a state where the both batteries are connected in parallel.

4. The starter generator for an internal combustion engine according to

claim 3, wherein a series-parallel transfer switch is connected between the negative terminal of said first battery and the positive terminal of said second battery.